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Commercial Banks in Kenya**



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Effect of Financial Innovations on Banks' Loan Portfolio: A Case of Commercial Banks in Kenya



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Abstract

Purpose: The study sought to investigate the effect of financial innovations on loan portfolio of Commercial Banks in Kenya. The main problem was that even though banks have implemented financial innovations, the level of loans uptake in terms of volume and quality remains unclear as indicated by opposing findings by different studies. Most past studies on Kenya have covered relatively shorter study periods which may not reliably capture the financial trends, more so given the short shelf life of financial studies caused by rapid changes in the financial sector.

Methodology: This study adopted Positivism philosophy. It was based on correlational research design. The target population for the study comprised of all of the 42 commercial banks licensed by the Central Bank of Kenya to provide financial and other banking services in Kenya. Purposive sampling technique was used to select the sample of 12 CMA / NSE listed banks. Secondary data was used. They were obtained from audited financial reports of listed commercial banks, CMA and the CBK in the period 2007 to 2017. The data was analyzed using fixed effect and pooled regression of panel data analysis.

Results: The findings of the study indicated that there is positive and significant effect between financial innovation and loan portfolio of commercial banks. The findings indicated that the overall R-squared was 0.5928. This means that on average, 59.28 percent of all variations in loans are explained by financial innovation, holding all other factors constant. This indicates that if the banks in Kenya implemented more financial innovations, the financial performance measured by loan portfolio would increase. Based on the findings, the study concluded that commercial banks have implemented technological innovations in various areas such as EFT, Branch networking and Mobile banking which have improved the banks' loan portfolios.

Unique contribution to theory, practice and policy: The study recommended that Commercial banks should adopt financial innovations that would positively influence loan portfolio. It shall signal the government, policy institutions, industry players and stakeholders to re-strategize finance-oriented innovations with the view to improve policy framework in order to streamline

the financial sector, especially banking. The study offers literature and data for academic reference as well as guidance for investment by banks and other investors.

Keywords: *Financial Innovations, Financial Performance, Loan Portfolio, Commercial Banks.*

1.0 INTRODUCTION

1.1 Introduction

Owing to changes in the global financial system, the role of banking in financial intermediation has witnessed tremendous transformation (Pradhan, et al., 2016). These changes have extensively infiltrated the LDC's emerging markets and systems. On its part Kenya has increasingly embraced the global economic and financial changes as well as making major strides towards financial inclusion (Ayubjon o'gli, 2022). The main drivers for financial innovation have been globalization of financial systems, deregulation, and great advances in technologies (Muia, 2017). In increasingly integrated financial systems facing higher volatilities, more competition and wide varieties of risks, financial innovation has become an essence to provide new products and strategies to better suit different circumstances of time and market and to meet different requirements of participants in financial system (Ignazio, 2007). Financial innovation is a modern risk and cost reduction tool or method with ability to yield higher utility to market demand (Frame, Wall, & White, 2018). It includes growth of numerous and increase in diverse types of financial institutions that in sum total produce a revolution in the delivery of financial services.

Banking sector is among the most significant economic sectors in modern societies (Lee, Wang, & Ho, 2020). Banking sector is an integral part of an economy and a crucial element in savings mobilization and investments drive (Pringle & Jones, 2011). Financial intermediation transforms the maturity of the portfolios of savers and investors, while providing sufficient liquidity to the system as the need arises. Financial intermediation generates necessary liquidity to the economy through maturity transformation of investors' and savers' portfolios. Through risk pooling and sharing as well as diversification methods, financial intermediaries lower risks in the economy's financial system (Qamruzzaman & Jianguo, 2018). Khraisha and Arthur (2018) points out that the stream of financial innovations in a competitive environment is influenced by market power of enterprises; enterprise size; technological opportunity; appropriateness and product market conditions.

Lending institutions have loan portfolios as their principal assets. The value of loan portfolio is interest rates dependent. Its value equally depends probability of payment of the principal plus attendant interest (Zarutskie, 2013). Lending being the principal business activity and the major source of income for most commercial banks, calls for not only enhanced volumes in lending through innovation but also fortified loan portfolio management (LPM) anchored on innovation to reduce risks inherent in the credit process (Ngumi, 2014). The Kenyan banking sector is

dominated by six commercial banks in terms of total assets, customer deposits, net loans and profit before tax. The dominant banks are KCB Bank, Equity Bank Ltd, Cooperative Bank of Kenya, Standard Chartered Bank, Barclays Bank of Kenya and Diamond Trust Bank. In 2017, the six banks held 73 per cent of the 1,910,000 total banking accounts. The dominance in the banking industry by these six banks is also documented by (Ngumi, 2014) who shows that these banks held about 60 per cent of total deposits and about the same level of total loans and advances. Of these banks, Kenya Commercial Bank is currently the market leader with a total asset of Kshs 480 billion, customer deposits of Kshs 372 billion and net loans to customers of Kshs 332 billion as at December 2017.

1.2 Problem Statement

Commercial banking industry in all economies have been facing increased performance volatilities due to high competition, interest rate fluctuations, high credit risk, exchange rate fluctuations and liquidity problems (Muthinja & Chipeta, 2018). To overcome these challenges, commercial banking is evolving globally from conventional banking through financial innovations (Ayubjon o'gli, 2022). A lot of innovations have been undertaken in banking sector that have led to proliferation of financial products, activities and organizational forms that have improved the efficiency of the financial system (Arnaboldi & Rossignoli, 2015).

Financial innovations such as branch networking, agency banking, mobile banking, electronic funds transfer are currently perceived to enable cost effective service delivery in the banking sector (Muia, 2017). In spite of uptake of these cutting edge innovations by the banking sector, return on assets and return on equity still remain low and unpredictable (Saula, Akinlabi, & Makinde, 2023). Furthermore, loans uptake in terms of volume and quality remain low in relation to banked population. Despite its importance and the presence of extensive literature on financial innovations, a number of past studies have largely focused on process innovation as opposed to product and financial services innovation. Secondly, most past studies on Kenya have covered relatively shorter study periods that may not reliably capture the financial trends, more so given the short shelf life of financial reports caused by rapid changes in the financial sector. This study therefore examined the effect of financial innovation on the loan portfolio of commercial banks in Kenya between the years 2007 and 2017.

1.3 Research Objective

1. To establish the effect of financial innovation on the banks' loan portfolio.

1.4 Significance of the study

The study is expected to reveal how commercial banks should adopt financial innovations that would positively influence loan portfolio. The outcome of this study shall signal the government, policy institutions, industry players and stakeholders to re-strategize finance-oriented innovations with the view to improve policy framework in order to streamline the financial sector, especially

banking. In addition, the study is expected to offer literature and data for academic reference as well as guidance for investment by banks and other investors.

2.0 LITERATURE REVIEW

2.1 Theoretical Review

This section reviews Loanable Funds Doctrine, Schumpeter Theory of Innovation and Financial intermediation theory.

2.1.1 Loanable Funds Doctrine Theory

The loanable funds doctrine (LFD), a product of the Stockholm school, is a theory of the market interest rate. According to this approach, the interest rate is determined by the demand for and supply of loanable funds namely loans, bonds or savings deposits. The loanable funds market consists of borrowers and lenders of funds. The demand for loanable funds arises for the purposes of investment, hoarding and dissaving. A bank has to acquire a position where it has adequate deposits in order to gain the position of a lender. To achieve this, banks must develop or adopt effective innovations, which attract deposits and encourage heightened borrowing by customers (Robertson and Ohlin, 1990).

The basic control variables for loan base are; Gross Domestic Product growth, loan demand, country specific fixed effects and, in some specifications, time and bank-specific fixed effects. For the bank to perform, its intermediation process should be strengthened. This can be achieved if banks adopt or come up with appropriate financial innovations which increase loan volumes for example use of mobile loans, agency loans, increased branch loans. Banks can also enrich their loans through use of risk assessment, invoice financing for short term needs, transforming lending into long-term partnership or reduce loan default, the impact of which can only be ascertained through performance reviews via internal and external studies (Liu, Peng, & Yu, 2018).

The main weaknesses of loanable funds theory are; it's indeterminate, it assumes both savings and income are independent; it's impracticable, it assumes savings, hoardings, investment unrelated to interest rates; unsatisfactory integration of real and monetary factors lastly it (unrealistically) assumes that the level of national income remains unchanged. The theory is relevant in this study since it points the importance of hoarding on interest rate; it links liquidity preference, quantity of money, savings and investment and consideration the role of the bank credit, which acts as an important source of loanable funds. This study tested this theory to establish the effect of financial innovation on banks' loan portfolio bases.

2.1.2 Schumpeter Theory of Innovation

Schumpeter (1934) argued that entrepreneurs, (independent inventors or Research and Development engineers in large corporations), created the opportunity for new profits with their innovations. In turn, groups of imitators attracted by super-profits would start a wave of

investment that would erode the profit margin for the innovation. Schumpeter emphasized the role of entrepreneurship and the seeking out of opportunities for value generating activities which would expand and transform the circular flow of income, but it did so with reference to a distinction between invention or discovery on one hand and innovation, commercialization and entrepreneurship on the other (Ziemnowicz, 1942).

Schumpeter's theory of creative destruction identified innovation as the critical dimension of economic change. He argued that economic change revolves around innovation, entrepreneurial activities and market power and sought to prove that innovation-originated market power could provide better results than the invisible hand and price competition. He argues that technological advance is the main source of economic growth and improvements in the quality of life. It further states that a significant part of the incentive to produce leapfrogging innovations is the prospect of achieving monopoly profits. The theory finds strength in its recognition of the reduction of time from design to production through innovation, which equally reduces cost and provides competitive advantage to a firm over unforeseen limitations. This motive-based theory informed this study as it tried to evaluate if there is, and what the effects of bank innovations are, on goal attainment especially of loan portfolio of NSE listed commercial banks in Kenya.

2.1.3 Financial Intermediation Theory

According to the financial intermediation theory, financial innovations occur because agents in the market are searching for new ways to make higher profits. A change in the economic environment triggers a search for financial innovations that are likely to be profitable. Information asymmetries generate market imperfections hence deviations from the neoclassical framework, these imperfections lead to different forms of transaction costs. Financial intermediaries are seen to overcome these costs partially. Diamond and Donner (2007) consider banks as coalitions of depositors that provide households with insurance against idiosyncratic shocks that adversely affect their liquidity position. According to Diamond (1984), financial intermediaries are delegated monitors on behalf of the ultimate savers. The theory contributed to this research since it highlights the role played by monetary intermediaries, in this case the banks, which act as agents to community members and bridge the balance of payment gap. This theory guided the pursuit of this study in determining the effect of financial innovation on loan portfolio.

2.2 Empirical Literature Review

Kadioglu and Ocal (2017) in their study on effect of asset quality on the bank profitability in Turkey, found that there is significant negative relationship between non-performing loans and bank profitability. The higher the non-performing loans, the lower the banks' financial performance. Trujillo - Ponce (2013) in his GMM estimator study on what determines the profitability of banks in Spain found that; high bank assets, a high population of customer deposits, good efficiency, and low credit risk led to profitability. It also found that all industry and macroeconomic determinants with exception of interest rate, affect bank profitability in the

anticipated ways. Athanasoglou, Daniilidis, and Delis (2014) assert that banks' asset is another bank specific variable that affects the profitability of a bank. The bank asset includes among other current assets, credit portfolio, fixed asset and other investments. Often a growing asset (size) is related to the age of the bank. More often than not, the loan given out by a bank is the major asset that generates the major share of the banks' income. The quantity and quality of loan portfolio therefore determines the profitability of banks.

In West Africa, Alhassan, Tetteh, and Brobbey (2016) in their empirical examination of asset quality in a crisis period in Ghanaian banks found that; Persistence of non - performing loans in addition to loan growth, bank market structure, bank size, inflation, real exchange rate and GDP growth are significant determinants of bank asset quality in Ghana. Secondly, it found that asset quality has a positive relationship with financial performance.

According to Abrol (2016), highly educated and younger people are the main users of internet banking. From his study on impact of internet banking on customer satisfaction and business performance in India, he found that customers were satisfied with their banks' e-banking services which save on costs, time and offers unlimited remittance. The study also found that internet banking is essential for banks' survival and for a bank to compete effectively, it is mandatory. Kiragu (2017) in his study on effect of e-banking on the financial performance of Kenyan banks, found that e-banking had positive impact on services offered to customers due to easy access to accounts, it therefore improved profits. The study also noted that e- banking has the potential of increasing costs, which may lead to negative impact on performance. This necessitates diversification and reduction of subscription fees for PoS banking.

According to Lee et al (2020) financial innovation has not only opened up new opportunities for the sector participants, but also increased new market players arising from new products in the financial market. These developments have increased the range of financing and investment opportunities available to economic agents besides changing the role of banks with expanded diversification choices in terms of portfolio and sources of financing. Such developments affect the speed and strength of the channels of monetary policy transmission mechanism in the economy. As financial markets become liquid and complete, changes in official interest rates are more readily transmitted to the whole term structure and more generally to financial asset prices.

On online bank performance, DeYoung, Lang, and Nolle (2007) report that Internet adoption improved U.S. community bank profitability – primarily through deposit related charges. Supportive access factor of mobile banking is associated with user satisfaction. Mobile banking gives room to more users; it therefore improves bank financial performance. This is according to a study carried out in Jordan on effects of mobile banking on customer interaction and bank performance (Al-Homaidi, Almaqtari, Yahya, & Khaled, 2020). The study also found that mobile banking applications help customers manage their finances better, clarity of mobile banking user lines enhance customer satisfaction, easy recognizability of mobile banking provider boosts confidence and quality of some products enhances customer satisfaction. The

study noted that uptake depends on level of publicity and the aspect of fear of fraud. If not checked, these would lower financial performance of the banks.

3.0 RESEARCH METHODOLOGY

This study adopted positivism philosophy. It was based on correlational research design. The target population for the study comprised of all of the 42 commercial banks licensed by the Central Bank of Kenya to provide financial services in Kenya. Purposive sampling technique was used to select the sample of 12 CMA / NSE listed banks. Secondary data was used. They were obtained from audited financial reports of listed commercial banks, CMA and the CBK in the period 2007 to 2017. Data from the secondary sources was log transformed to reduce skewness of measurement variables. The principal explanatory variables were Branch networking, Mobile banking, Electronic funds transfer, Total assets and Internet/agency banking. However, during data collection and data analysis, ROA, ROE and Loans were confirmed to have statistically significant explanatory tendencies on all other variables including themselves. Therefore in line with Bhandary (2020) and Thomas (2020), the three (ROA, Loans and ROE) were adopted as alternating/ multi-level (none of the three can regress against itself) independent /explanatory variables in the study. The study was based on fixed effect and pooled regression of panel data analysis.

The model took the following format:

$$Y_{it} = \alpha_0 + \alpha_1 X_{1it} + \alpha_2 X_{2it} + \alpha_3 X_{3it} + \alpha_4 X_{4it} + \alpha_5 X_{5it} + \alpha_6 X_{6it} + \alpha_7 X_{7it} + \eta_{2it}$$

Where Y_{it} is Loans advanced, $X_{1it}, X_{2it} \dots X_{7it}$ are vectors of explanatory variables as outlined in table 1 below.

$\alpha_0, \alpha_1 \dots \alpha_7$ are parameters to be estimated.

η_{it} is the error term

Table 1: Explanatory variables

Symbol	Abbrev.	Variable	Unit of Measure in Ksh.
X_1	BN	Branch networking	Millions (Ksh)
X_2	MBS	Mobile banking services	Millions (Ksh)
X_3	EFT	Electronic funds transfer	Billions (Ksh)
X_4	TA	Total Bank Assets	Billions_(Ksh)

X_5	IB	Internet/Agency Banking	Thousands (Ksh)
X_6	ROA	Return on Assets (Alt.)	%
X_7	LN	Loans (Alt.)	Millions (Ksh)
X_8	ROE	Return on equity (Alt.)	%

Note: Alt. means Alternating, i.e. X_6 , X_7 and X_8 were applied as explanatory variables at multi-level (in subsequent studies linked to the current study)

4.0 RESULTS AND DISCUSSIONS

The descriptive statistics includes the mean, standard deviation, maximum and minimum values of the data set as shown in table 2 below.

Table 2: Descriptive statistics for study variables

Variable	Obs	Mean	Standard deviation	Min	Max
Return on Asset	132	3.744471	1.696728	-2.07	7.7
Electronic Fund Transfer	132	36.95451	13.72557	12.75	116.431
Mobile Banking Services	132	44.17228	32.31779	1.347	120.23
Internet /Agency banking	132	5799.955	2526.484	1830	15848
Total assets	132	126248.9	114976.2	587	555630
Branch networking	132	6035.523	6505.473	-1434	28482
Return on Equity	132	25.50092	9.975976	-16.9	56
Loans advanced	132	78148.26	71881.8	3342	411666

Source: Own Compilation from Data used in the study

Table 2 presents the results of descriptive statistics and indicates that the mean value for the loans advanced by the various commercial banks was Ksh. 78148.26 million with a standard deviation of Ksh. 71881.8 million. This suggests that, for the commercial banks under analysis, there was a big difference in the amount of loans advanced to the various borrowers who vary from households to corporates. The maximum was Ksh. 411666 million while the minimum was

Ksh. 3342 million. Several factors influence loans given out and profits earned from them. It's only safe to indicate that larger banks with wide customer base reaped more owing to higher disposable funds with them. The low minimum values are subject to low economic downturns amongst other limiting factors such as legal lending requirements. Interest rates were held constant in this study.

Panel unit root test

A unit root test was carried out using Im Pesaran Shin (IPS) panel unit root test. The test was necessary to ensure that all study variables were stationary before any other analysis was done so as to avoid getting spurious results. Where the results were not stationary at level, differencing was carried out to achieve stationarity. The results of this test are shown on table 3 below.

Table 3: Panel unit root test

Variable	Level	t- statistic	P-value	Remarks Stationary at;
LROA	level	-3.0788	0.0010	I (0)
LEFT	level	-1.2878	0.0989	I (0)
LMBS	level	-1.2007	0.8851	I (1)
	1 st difference	-4.6892	0.0000	
LIB	level	-1.0236	0.1530	I (1)
	1 st difference	-4.6892	0.0000	
LBN	level	-2.4712	0.0067	I (0)
LTA	level	-1.2649	0.1029	I (1)
	1 st difference	-3.8745	0.0001	
LROE	level	0.7027	0.7589	I (1)
	1 st difference	-5.0057	0.0000	
LA	level	-1.9662	0.0246	I (0)

Critical values for IPS

1% \Rightarrow -2.100

5% \Rightarrow -1.920 bn[10% \Rightarrow -1.830

Criteria: If t-statistic calculated is greater than t-critical, reject H_0 of unit root presence and conclude variable is stationary. Or, using P values; if P-value is statistically significant, reject the H_0 of unit root presence and conclude variable is stationary.

From the output presented in table 3, half of the variables; LROA 0.0010, LEFT 0.0989, LBN 0.0069 and LA 0.0246 were found to be stationary at level while the other half; LMBS 0.0000, LIB 0.0000, LTA 0.0001 and ROE 0.0000 were stationary at first difference. This means that there exists short-run and long-run and/ or constant relationships between the variables, that is, they are stationary and dependent. This paved way for use of the variables for further analysis in the study.

Hausman Test for Effect of finnovs on bank's loan portfolio

The study conducted Hausman test on the data to determine the appropriate regression model to be used in the analysis for the loans model. The results are presented in table 4 below.

Table 4: Output for Hausman test for Loans

	Coefficients			sqrt (diag(V_b_V_B))
	(b)	(B)	b-B	
	Fe	Re	Difference	S.E.
EFT (Electronic Funds Transfer)	.5033615	-.2443343	.7476958	.0933854
MBS (Mobile Banking Service)	.0805175	.0799232	.0005943	.0351754
BN (Branch Networking)	.3824799	.549581	-.1671011	.
TA (Total Assets)	.0150352	.0616964	-.0466612	.
ROA (Return on Assets)	-.278198	-.3290806	.0508826	.
ROE (Return on Equity)	-.2914508	-.3183916	.0269408	.

b consistent under H_0 and H_a ; obtained from xtreg

B = consistent under H_a , efficient under H_0 ; obtained from xtreg

Test: H_0 : difference in coefficients not systematic

$$\text{Chi2 (6)} = (\mathbf{b}-\mathbf{B})' [(\mathbf{V}_b-\mathbf{V}_B)^{-1}] (\mathbf{b}-\mathbf{B})$$

$$= 99.40$$

$$\text{Prob}>\text{chi2} = 0.0000$$

($\mathbf{V}_b-\mathbf{V}_B$ is not positive definite)

Note: P value (0.000) is significant ($P < 0.05$), hence we accept the null hypothesis.

The results indicate that the estimates were significant therefore fixed effects model was selected for use in analyzing and presenting the panel data, (regression) analysis on loans.

Multicollinearity test for Effect of finnovs on bank's loan portfolio.

The study employed Pairwise correlation analysis to test for multicollinearity. The results of the study are summarized in table 5 below.

Table 5: Multicollinearity output table for Loans.

	LA	BN	MBS	EFT	TA	IB
LA (Loans Advanced)	1.000					
BN (Branch Networking)	0.7865 0.0000	1.0000				
MBS (Mobile Banking Service)	0.4587 0.0000	0.3547 0.0000	1.0000			
EFT (Electronic Funds Transfer)	0.0013 0.0098	0.0433 0.0062	0.3904 0.0000	1.0000		
TA (Total Assets)	0.7948 0.0000	0.7620 0.0000	0.4561 0.0000	0.0907 0.0301	1.0000	
IB (Internet Banking)	0.6516 0.0000	0.5892 0.0000	0.2854 0.0009	-0.0629 0.0473	0.6640 0.0000	1.0000

*Correlation coefficients- first row.

*P-values - second row.

P-values were noted to be equal to or below 0.05. The null hypothesis was therefore rejected. Similarly, the correlation coefficients shown in Table 5 (the highest being 0.7865 for Branch networking) indicate low levels of multicollinearity therefore ruling out the problems of multicollinearity. According to Gujarati (2009), multicollinearity is regarded high if the correlation coefficient is more than 0.8. From the results presented in table 5, all the correlation coefficients had values less than 0.8 and therefore, no variable had high correlation with another variable. This paved way for use of the variables with no further transformations.

Regression output: Effect of finnovs on banks' Loan portfolio.

To estimate the effect of banking innovations on loans for commercial banks, the study started by estimating three regression models. The models included pooled regressions, the random effect model and the fixed effect model.

To discriminate among the three models, the study conducted the Hausman test to identify the best model to be used. The appropriate model was Fixed Effects model. This is because the P-value of the Hausman test was found to be 0.0000 which was statistically significant. Table 6 presents the empirical findings for loans portfolio.

Table 6: Regression Results for Loans Portfolio

Dependent variable: Loans				
Variable	Coefficient	Std error	t-statistic	P-value
EFT (Electronic Funds Transfer)	0.503	0.384	1.31	0.194
MBS (Mobile Banking Service)	0.081	0.065	1.22	0.224
BN (Branch Networking)	0.382	0.063	6.06	0.000
TA (Total Assets)	0.015	0.065	0.23	0.017
ROA (Return On Assets)	-0.278	0.118	-2.36	0.020
ROE (Return On Equity)	-0.291	0.086	-3.38	0.001
Cons	14.532	1.366	10.63	0.000

$F(6,102) = 10.29$

Prob>F = 0.0000

Hausman test P-value = 0.0000

R-squared within = 0.3770

between = 0.8290

overall = 0.5928

From table 6, the probability of the F-statistic was found to be 0.000, meaning that it was statistically significant at one per cent level of significance. This means that the coefficients of the variables in the model were jointly different from zero implying that EFT, MBS, BN, TA, ROE and ROA were jointly important in explaining Loans. Table 4 indicates that the overall R-squared was 0.5928. This means that on average, 59.28 percent of all variations in Loans are explained by EFT, MBS, BN, TA, ROE and ROA, holding all other factors constant. The coefficients were; EFT (0.503), MBS (0.081), TA (0.015) and branch network (0.382). They were found to positive and statistically significant at one percent level of significance.

The positive relationships are in agreement with studies by; Mannah-Blackson, (2004) in Ghana who found that branch networking saved time and speeded up -inter branch transactions leading to efficiency and increased incomes; Kazumine (2017) on regional banks in Japan who found that more branches led to increase in their loans and bills discounted; Musyoka (2011) in Kenya found that increased branch network spread led to growth in all areas and measures of performance like total profits, assets deposits and shareholder's equity and loan portfolio. Lastly Nyatika (2017) in Kenya found that branch network and other forms of finnovs are instrumental in improving access to bank products and services and addressing unmet needs of customers including enterprise loans. All the above listed studies found that various financial innovations positively impacted on both financial and overall performance of financial institutions in their areas of study. On the contrary, the coefficient of ROA was found to be -0.278 and Return on equity was found to be -0.291 both are negative and statistically significant at five percent level of significance. This implies that a unit increase in ROA and ROE would respectively lead to 0.278 percent and 0.291 percent decrease in Loans *ceteris paribus*. This observation points to the negative effect of competition for resource allocation between competing investment portfolios. The finding corroborates Ogada et al (2019) which concluded that non-performing loans negatively affect bank balance. The negative relationship concurs with Kadioglu and Ocal (2017) study on effect of asset quality on the bank profitability in Turkey, which found that there is significant negative relationship between non-performing loans and bank profitability. The higher the non-performing loans, the lower the financial performance of the bank

5.0 CONCLUSIONS AND CONTRIBUTION TO POLICY PRACTICE AND THEORY

From the findings, the probability of the F-statistic was found to be 0.000, meaning that it was statistically significant at one per cent level of significance. This means that the coefficients of the variables in the model were jointly different from zero implying that EFT, MBS, BN, TA, ROE and ROA were jointly important in explaining Loans. The overall R-squared was 0.5928,

meaning that on average, 59.28 percent of all variations in Loans are explained by EFT, MBS, BN, TA, ROE and ROA, holding all other factors constant.

The coefficient of branch network was found to be 0.382. The coefficient was positive and statistically significant at one percent level of significance. This implies that a one percent increase in branch network would lead to a 0.382 percent increase in Loans holding all other factors constant. The positive effect is an indication that if commercial banks in Kenya increased their branch network, there would be an improvement in their loan levels. This would be as a result of more people getting enrolled to the accessible new bank branches and their services leading to probable more loan uptakes.

This finding is in agreement with Mannah–Blackson, (2004) whose study in Ghana found that branch networking offers quicker rate of interbank transactions as the consequence of distance and time are eliminated, productivity per time period is increased and simulated division of labor among bank branches with its associated positive productivity among the branches is realized. Increased branch networking would inevitably make loan access less branch-specific therefore more beneficial to the customers as well as the bank. This finding also conforms to Kazumine (2017) whose study on regional banks in Japan found that banks with more branches can increase their loans and bills discounted as well as their small and midsize enterprises loans and bills discounted.

5.1 Conclusion

The study concludes that financial innovations lead to better loan portfolio. Based on the findings, the study concluded that commercial banks have implemented technological innovations in various areas such as Agency, EFT and mobile banking, which has improved the loan portfolio of the banks.

5.2 Recommendations

The study recommends that Commercial banks should effect financial innovations that are risk-free for them and their customers in areas such as loaning, electronic funds transfer and mobile banking services. Further, banks and regulatory bodies should strive to innovate for better and cheaper financial innovations with better uptake, shorter break evens, and higher transaction capacity and by extension higher commissions and incomes.

5.3 Areas for Further Studies

The study suggests that further areas of study should focus on digital lending companies, which have implemented on financial innovation for loan services. This would establish whether the observed relationship between financial innovation and loan portfolio in commercial banks applies to pure digital lending companies. The financial innovations under study were Mobile Banking Services, Electronic Funds Transfer, Total assets, Internet/Agency banking and Branch networking. Based on the nature of this study and its findings, the study suggests further research

to determine the effect of financial innovation on financial deepening of commercial banks and other non-banking financial institutions in Kenya.

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